NOTES ON CHINESE EUPHORBIACEAE

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THE MATERIAL used in the preparation of these notes is derived from the collections of the Arnold Arboretum (A) and of the Gray Herbarium (G) of Harvard University, of the New York Botanical Garden (NY), the University of California (UC), and the Fan Memorial Institute of Biology, Peiping (FI). In addition to the specimens cited, the very extensive collections of the Arnold Arboretum, New York Botanical Garden and University of California have been consulted without in every case referring to specimens by number.

The writer gratefully acknowledges the loan of type-specimens from the Royal Botanic Gardens of Kew (K), the contributions of photographs and fragments of types from the Conservatoire et Jardin Botaniques, Geneva, and the communication of data and seed by F. C. Greatrex Esq., Nagasaki, Japan.

ANTIDESMA Burm. ex L.

Antidesma hainanense Merr. Philip. Jour. Sci. **21:** 347. 1922. — Gagnep. in Lecomte, Fl. Gén. Indochin. **5:** 507. 1926.

Antidesma Fleuryi Gagnep. Bull. Soc. Bot. France, **70:** 121. 1923.

KWANGSI: Shap Man Tai Shan, Shang-ze District, *Tsang 22210* (A).

Previously unrecorded for continental China. The ♀ specimen is in flower, and closely matches *Poilane 6347* (A) from Annam, which is apparently a specimen cited by Gagnepain. The leaf nerves in this species are unusually strong throughout, impressed above, pubescent and reddish brown. In its pubescent ovary and fruit, *A. hainanense* resembles *A. Fordii* Hemsl. (*A. yunnanense* Pax & Hoffm.), from which it differs in all vegetative characters.

MALLOTUS Lour.

Mallotus barbatus Muell.-Arg. Linnaea, **35:** 184. 1865; in DC. Prodr. **15**(2)**:** 957. 1866. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 164. 1914.

Mallotus barbata Hemsley, Jour. Linn. Soc. Bot. **26:** 438 (Enum. Pl. Sin. II). 1894.

Mallotus Esquirolii Léveillé, Rep. Spec. Nov. **9:** 461. 1911.

Mallotus Leveillanus Fedde, Rep. Spec. Nov. **10:** 144. 1912. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 165. 1914. — Rehder, Jour. Arnold Arb. **14:** 232. 1933.

Mallotus Leveillei Fedde ex Léveillé, Fl. Kouy-Tchéou, 165. 1914.

The specific characters of *M. Leveilleanus* are described by Pax & Hoffmann, ". . . indumento ramulorum et petiolorum pulverulento-stellato nec molliter echinato, stylis papillosis nec plumosis . . ." The illustration of *M. barbatus* by the same authors was made apparently from *Henry 9525b* (A), which they cited. I am unable to separate this specimen from a *Cavalerie* sheet, Kweichow (A), which represents *M. Esquirolii*. The indument of *Mallotus* is usually variable in thickness, especially in the hairier species. The specimens of *M. barbatus* in which the indument becomes less dense occur with states of pubescence intermediate between those which Pax & Hoffmann ascribe to *M. barbatus* and to *M. Leveilleanus*.

Mallotus barbatus Muell.-Arg. var. **pedicellaris,** var. nov.

A typo pedicellis fructigeris praesertim ad basim racheos elongatis bracteolatis ad 5 cm. longis recedit.

SZECHUAN: Chung-hsien, in thickets, *Fang 680* (A).

Mueller-Arg. in his consideration of *M. barbatus* describes the pedicel as long as the fruit, which agrees with the note of Pax & Hoffmann ". . . pedicelli ♀ sub fructu fere 1 cm. attingentes." In this new variety the fruits are pendulous, especially at the base of the cyme, and the pedicels bear bracteolar scars. This character may be suspected, as such, to represent an occasional elongation of the pedicel. However, in another specimen, *Handel-Mazzetti 10364* (A) Kweichow, unfortunately with only young fruits, elongated and bracteolate pedicels are also in evidence suggesting the varietal validity of the character. Metcalf has proposed the var. *congesta* (Lingn. Sci. Jour. **10:** 487. 1931), for a form that has sessile or subsessile fruits on a short congested inflorescence. The present new variety and var. *congesta* are very doubtfully conspecific, and it is probable that a better knowledge based on more ample collections of Chinese *M. barbatus* will introduce further changes in the treatment and limits of the species.

Mallotus nepalensis Muell.-Arg. Linnaea, **34:** 188. 1865; in DC. Prodr. **15**(2)**:** 964. 1866. — Hook. f., Fl. Brit. Ind. **5:** 428. 1887, p.p. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 165. 1914, p.p.

The binomial was based upon a Wallich specimen which I have not seen. However, photographs and fragments of *M. oreophilus* Muell.-Arg. *α ochraceo-albidus* and *β floccosus* from the type-collections in the

herbarium of the Botanical Garden of Geneva were communicated by Prof. Hochreutiner; also, isotypes, *Thomson 1857* (♂ spec.) sub *Rottlera* from Sikkim 5–6000′ (G), and *Hooker & Thomson* (♀ spec.) sub *Rottlera* 5 from Khasia, (K); *Henry 10925, 13697* (NY) and *13060* (A), from Yunnan cited by Pax & Hoffmann were seen. This material has been considered by Hooker f. and by Pax & Hoffmann to represent *M. nepalensis*, or its varieties.

According to Mueller-Arg., the differences between *Mallotus nepalensis* and *M. oreophilus* α *ochraceo-albidus* (the type of the species) are, (a) capsular indument crowded in *M. oreophilus*, open in *M. nepalensis*, (b) limb subrhombic-ovate, subangustate at the base in *M. oreophilus*, triangular-ovate, subcordate in *M. nepalensis*, (c) limb indument ochraceous becoming darker in *M. oreophilus*, fulvous-ferrugineous in *M. nepalensis*, (d) stamens about 80 in *M. oreophilus*, 120 in *M. nepalensis*.

I have no material by which to judge the last character. The other characters may or may not be specific. Chinese specimens are available which answer the concept of *M. nepalensis* according to Mueller's description. It seems advisable to distinguish these specimens from others which agree with the types of *M. oreophilus* α *ochraceo-albidus*. Accordingly, to *M. nepalensis* I refer *Tsai 60944, 60954, 61017, 62332, 62552* collected at Ping-pien Hsien, Yunnan (A), with triangular-ovate occasionally subcordate leaves, and a thick tomentum tending to be orange-yellow. Two new locality records, *Pételot 1363*, Tonkin, Chapa (UC), and *Steward & Cheo 667*, No Kan, Lin Yuin Hsien, Kwangsi (NY, A) belong here, although the former has a paler indumentum, and may represent an intermediate with var. *ochraceo-albidus*.

Mallotus nepalensis α **ochraceo-albidus** (Muell.-Arg.) Pax & Hoffmann, op. cit. 166.

This variety is well represented in various herbaria under the names *M. apelta*, *M. tenuifolius*, etc. It differs from the former in floral characters and from the latter in the tomentum. *Wang 20909, 23096, 23147* (A), *Fang 2103, 7914* (A), from Szechuan, and *Tsai 52677* (A) from Yunnan belong here. A peculiar reniform limb is found on *Fang 2103* and *7914*, collected respectively at Omei-shan and at Kuan-Hsien. *Henry 10925, 13697* (NY) from Yunnan have leaves that tend to be like those of the species.

Mallotus nepalensis Muell.-Arg. var. **kwangtungensis,** var. nov.

A typo indumento subtiliore, foliis saepissime tricuspidatis sublatioribus quam longis diagnoscitur.

KWANGTUNG: Lokchong *C. L. Tso 20532* (**type,** NY), *21117* (A, NY).

This variety is more interesting because of the extension of the range for the species far to the east rather than on account of its variation from the species. The new variety may be found to intergrade with *M. japonicus* from which it differs typically in the thicker capsular indumentum, in the even, thicker, whitish pubescence, and in the stout simple inflorescence.

Mallotus tenuifolius Pax, Bot. Jahrb. **29:** 429. 1900. — Y. Chen, Man. Chin. Trees Shrubs, 618, fig. 1937.

Mallotus apelta tenuifolius (Pax) Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 171. 1914.

Mallotus oreophilus β floccosus Muell.-Arg. Linnaea, **34:** 188. 1865; in DC. Prodr. **15**(2): 964. 1866.

Mallotus nepalensis Hook. f., Fl. Brit. Ind. **5:** 428. 1887, p. p.

Mallotus nepalensis β floccosus (Muell.-Arg.) Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 166. 1914.

Mallotus japonicus Pax & Hoffmann, op. cit. 169. — Handel-Mazzetti, Symb. Sin. **7:** 214. 1931, quoad spec. Hupeh et Szechuan.

Broadly interpreted, the species is represented by geographical forms that range from Khasia in northeastern India to Chekiang, in China, at the western and eastern limits doubtless intergrading with *M. nepalensis* or with *M. japonicus*. Earlier taxonomic considerations of *M. tenuifolius* lack, in my opinion, a definite understanding of its specific limits. The concepts of *M. nepalensis* and of *M. japonicus* have been over-extended. The result is that *M. tenuifolius* has been deprived of its proper phytogeographic background by this over-extension. Characteristic of this notion is the treatment of Handel-Mazzetti who has rejected the validity of *M. tenuifolius*, distributing its forms between *M. nepalensis* and *M. japonicus*. Other authors have recorded conflicting opinions: Pax & Hoffmann have reduced *M. tenuifolius* to variety of *M. apelta* which was probably due to the lack of adequate material. Chen Yung contributes a fair character-sketch of *M. tenuifolius*, which he accepts as occurring in Chekiang, Hupeh and Szechuan.

The type is *Rosthorn 2262*, Szechuan, Nanchuan-hsien, of which there is an excellent photograph in the herbarium of the Arnold Arboretum. The original description and the photograph agree with two topotypes, *Fang 1222* (A), and *Chu 1483* (FI). The species is represented in American herbaria by numerous collections that indicate that its geographic center lies in Hupeh rather than in Szechuan. I am unable to separate from the typical form several specimens identified as *M. nepalensis* var. *floccosus*, or *M. nepalensis*, such as *Henry 13060* (A), *13060a* (NY), *Forrest 15877, 18150, 26702* (A) from Yunnan; *Forrest 19870, 19244* (A), *Rock 10207* (A, UC) from Eastern Tibet (Sikang);

Handel-Mazzetti 9014 (A) from Yunnan; *182* (A) from Kweichow; *777* (A) from Hunan. The greatest difference that I note between these specimens and material that more closely matches the type is a stouter and usually longer inflorescence in the cited numbers of Henry, Forrest, Rock and Handel-Mazzetti. The character, however, is not absolutely valid if one judges from all the available material; it is suggested that it may depend, as Wilson remarks (Sargent, Pl. Wils. **2**: 525. 1916), upon the vigor of the shoot. In no case can the pubescence on the lower surface of the leaf be described as a continuous tomentum. It varies in thickness and apparently in persistency, being almost absent in *Chu 1483,* and more conspicuous in the Tibetan specimens, which also have rounder leaves. With better material it may be found convenient to segregate these Tibetan specimens from the type.

Numerous specimens from Szechuan, e.g., *Farges 98* (A); *Silvestri 1302* (A); Hunan, *Handel-Mazzetti 46* (A); Kweichow, *Tsiang 4951* (A); Kiangsu, *Ching & Tso 420* (A), I judge to be within the limits of this species, although on the average they have smaller and less pubescent leaves than the specimens collected in Tibet and Yunnan. It is indicated that even in its purely Chinese range *M. tenuifolius* includes a number of forms resulting from altitudinal and local geographic segregations.

Mallotus tenuifolius Pax var. **floccosus** (Muell.-Arg.), comb. nov.

Mallotus orcophilus β floccosus Muell.-Arg. in DC. Prodr. **15**(2): 964. 1866.

KHASIA: *Hooker & Thomson* (*Rottlera No. 5*) (♀ spec.) (K), **type.**

In my understanding the variety is essentially represented by the Khasian plant with an elongated ovate leaf, a fairly thick indument, and strong nervules. It is advisable to maintain it distinct on geographic considerations, although, aside from the form of the leaf and the length of the inflorescence, I cannot find in the single available specimen, characters that sharply separate it from forms intergrading with the type of the species.

Mallotus tenuifolius Pax var. **subjaponicus,** var. nov.

A typo foliis saepius cuspidatis, petiolis valde elongatis, indumento interdum nullo, cymis validioribus recedit.

FUKIEN: in monte Tienhwa-schan, ad occ. urbis Dingdschou ("Tingchow"), substr. arenaceo, loco lapidoso, leg. *Wang-Te-Hui 391* (A, fruit), **type.** — KIANGSI: Lushan Mountains, 700–800 m., tree, *Chung & Sun 160* (A, fruit).

The new variety in vegetative characters, especially in the leaf is very similar to *M. japonicus* Muell.-Arg. for which it is usually mistaken in

the herbarium. It differs from that species in its unbranched inflorescences, its larger capsules (seed 5 × 5 mm.), and in its softer and finer capsular indument. In these characters it approaches *M. tenuifolius* of which it typically represents the eastern form.

Mallotus japonicus (Thunb.) Muell.-Arg. Linnaea, **34:** 189. 1865; in DC. Prodr. **15**(*2*)**:** 966. 1866. — Hayata in Jour. Coll. Sci. Tokyo **20**(3)**:** 44, *pl. 3j.* 1904. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 169. 1914, excl. spec. Hupeh, Szechuan. — Y. Chen, Man. Chin. Trees Shrubs, 618, *fig.* 1937.

Hutchinson was of the opinion (in Sargent, Pl. Wils. **2:** 526. 1916) that *M. japonicus* does not occur in Hupeh and Szechuan. Handel-Mazzetti believes, on the contrary (Symb. Sin. **7:** 214. 1931) that the range of the species extends to those provinces, and that Hutchinson incorrectly suggested that *M. tenuifolius* differs from *M. japonicus* in having an unbranched inflorescence. To justify this belief Handel-Mazzetti remarks in part that Chekiang specimens, like Japanese material, occur with branched inflorescences.

On the strength of numerous specimens seen, I may state, (a) *M. japonicus* does not occur in Hupeh and Szechuan. All the material from those provinces identified as *M. japonicus* belongs to *M. tenuifolius;* (b) the inflorescence is branched in *M. japonicus* and simple in *M. tenuifolius.* The character is diagnostically fully as important as Hutchinson and Chen Yung, who uses it in the key, state it to be. It is not absolute because specimens from Japan are occasionally found with an unbranched inflorescence like *Oldham 725,* Nagasaki (NY); (c) *M. japonicus* is represented in China by specimens fully as typical of the species as Japanese plants themselves. It seems certain that Handel-Mazzetti refers to one of these specimens, not to *M. tenuifolius* in disputing Hutchinson's statement. I cannot find the slightest difference between *Siebold in hb. Zuccarini* (NY), *Maximowicz, Iter Secundum, Nagasaki* (NY) and *R. C. Ching, 2085, 2025* (UC), *Chiao 853* (UC), *Faber s. n.* (A) from Chekiang; *Tso 1574* (A) from Kiangsu. I am not aware that *M. japonicus* reaches farther inland than Kiangsu, which Chen Yung indicates as the northwestern limit of the species.

It is interesting to note that in Formosa forms of *M. japonicus* occur which, in their vegetative characters, strongly suggest *M. tenuifolius, Warburg 9951* (A), *Gressitt 282* (A), *Henry 504* (NY), while in Fukien and Chekiang *M. tenuifolius* var. *subjaponicus* is found with the vegetative characters of *M. japonicus.* Thus in Kiangsu, Chekiang and Formosa an intergrading of forms may be believed to have taken place that marks the range as a single floristic unit with some marked Japanese

affinities. The opinion which I have elsewhere expressed (Sinensia, 6: 658. 1935) that plants with Chekiang range are necessarily distinct from Japanese endemics is not always tenable. The mouth of the Yangtze River is indicated at least as a secondary center of dispersal of plant biota that reach the Japanese archipelago at one end, Indo-China and the Himalayan region at the other. Numerous critical and transitional forms of the Euphorbiaceae occur in the Chekiang-Formosa range, and it is often open to question whether a Japanese species that is reported from the Chinese mainland is as wholly Japanese as the record expressed by the publication indicates.

Mallotus Lianus, sp. nov.

Arbor vel frutex 2–12 m. altus, cortice rubro-brunneo e speciminibus ipsis, in notulis collectoris et griseo-albido. Innovationes, axes florigeri petiolique tomento rubro-brunneo, tarde atque ex parte tantum deciduo, induti. Folia integerrima, breviter ac abrupte apiculata, orbiculari-ovata et cordata vel, rarius, subquadrangulari-ovata et late cuneata, 10–13 × 9–12 cm. magna, pallide olivacea vel brunnea, supra mox glabrescentia, subtus tomento rubescente subtili pro more persistente induto, glandulas hypophyllas lutescentes suboccultante; nervis utrinque 5–6, venulis subparallelis conspicuis; petiolo 5–8 cm. longo; glandulis 2 ad petioli apicem in limbo conspicuis. Inflorescentiae ♂ laxae, simplices vel multifidae, in speciminibus suppeditantibus immaturae; perianthii lobis subspathulatis, circiter 2 mm. longis, patentibus vel reflexis, facie interna glabris; staminibus 50–80; filamentis basi puberulis. Inflorescentiae ♀ simplices vel multifidae, ramulis erectis vel subpatentibus, quam axis florigerus longiores vel eum aequantes, ad 25 cm. longae, ad 8 cm. latae; perianthii lobis triangulari-acuminatis, patentibus vel reflexis, 2 mm. longis, facie interna glabris; ovario subgloboso, 3–4 mm. lato; pedicello circiter 2 mm. longo. Capsula processubus subulatis laxis armata secus coccorum commissuras confertioribus, primum stellato-floccosis, serius glabrescentibus, matura 7–8 mm. lata; pedicello 5 mm. longo; processubus ad 5 mm. longis; semine subgloboso, atro-brunneo, facie ventrali depressiusculo, 5 × 5 mm. lato, oculo armato obscure ruguloso.

KWANGTUNG, Tsing Wan Shan: Wong Chuck I and vicinity (Wung Yuen District) *Lau 2290* (♀ fl.; **type**) (A); Kwangtung, s. l., *Fenzel 123* fruit (UC); Yam Na Shan, Yit Nga Shan (Mei-Kaying District) *Tsang 21469* (♀ fl.) (NY). FUKIEN: Yenping, Cha-ping, on slopes, a shrub 2 m. high, flower light yellow, alt. 730 m. *Ching 3889* (immature fl.) (A). CHEKIANG: Pang Yung, in open, partly shaded forests, a small tree, 20 ft. tall, 6 in. girth, bark smooth, whitish grey, *Ching 2020* (♂ fl.) (A) (NY).

Mallotus Lianus is a fairly well characterized species for the genus in China. In the herbarium it has been identified as *M. ricinoides*, occasionally as *M. japonicus*. Its nearest affinity is undoubtedly with the latter species, which it resembles in the nature of capsular indumentum and in the total sum of vegetative characters. Specimens in which the leaves are glabrescent, *Tsang 21469*, Kwangtung (A); Yam Na Shan (Yit Nga Shan), Mey (Kaying District); *H. Hu 127*, Chekiang (A): Swen Chi, at first sight suggest *M. japonicus*. From this species, however, *M. Lianus* differs in the normally persistent and thicker red tomentum, which to the majority of taxonomists has suggested an inexistent affinity with *M. ricinoides*, in the less membranous limb, the much longer ♀ inflorescence, its plumose styles, larger ovary, and in the thicker capsular indumentum. I have not seen specimens of *M. ricinoides* from China, and only one collection of it from Annam, *Poilane 1685* (UC). *Mallotus Lianus* abundantly differs from that specimen in its lax, stiffer and glabrescent capsular indumentum, in its pedicellate, smaller capsule, and in its nearly smooth seed. While *M. ricinoides* and *M. apelta* belong to one affinity, *M. albus, M. Lianus, M. japonicus, M. nepalensis* and *M. tenuifolius* may be understood as members of a separate group. The path of migration of the five last species is suggested to lie along two main tracks: (1) India, Yunnan, Tonkin (*M. albus*); Kwangtung, Chekiang (*M. Lianus*); Chekiang, Formosa, Japan (*M. japonicus*); (2) northeast India, Yunnan, Tonkin, Kwangsi (*M. nepalensis*); and northeast India, Sikang [Eastern Tibet], Szechuan, Hupeh, Chekiang (*M. tenuifolius*). Whether the geographic sequence of migration is truly the one given here I may not say, and rather doubt. It conveniently emphasizes the systematic position of *M. Lianus* as geographically and taxonomically intermediate between *M. albus* and *M. japonicus*, and the importance of the Chekiang and Yunnan node in Chinese floristics, at least insofar as these nodes concern the Euphorbiaceae. It is very significant to find *M. philippensis* endemic in northwest India as well as species of *Macaranga* having Chinese and eastern Asiatic, not African affinities, in a narrow strip of land with comparatively abundant rains along the west coast of Deccan (cf. maps in Pflanzenr. **63 (IV. 147. VII)**: *t. 1*, 1914, and in Gamble, Man. Ind. Timbers, 1881). This distribution essentially tends to confirm an east to west distribution of *Mallotus*. The valley of the Yangtze River is the northern boundary on Chinese soil of the domain in which these distributional currents regardless of their direction, have operated.

As stated, I have not seen specimens of *M. ricinoides* from China. Mueller-Arg. cites *Croton mollissimus* Geisel., from China, in the syn-

onymy of *M. ricinoides*, from a specimen in Vahl's herbarium which is the type of Geiseler's species. If he correctly interprets Geiseler's type there can be no question of its being identical with *M. Lianus*, because the capsules of *Croton mollissimus* according to Mueller-Arg. (in DC. Prodr. **15**(2): 964. 1866) are ". . . sessilibus, dense et longe molliter echinatis, aculeis dense stellato-floccosis . . ." The description of *Croton mollissimus* in Geiseler's work (Croton. Monogr. 74. 1807), however, suggests that the type of this alleged *Croton* may not represent a *Mallotus* at all, and only very doubtfully a *Croton*. Even the Chinese origin of the specimen may be questioned. Geiseler speaks of "*caulis herbaceus*. Rami tomentosi, sulcati, incani. Folia petiolata alterna 3 vel 4 pollicaria, acuminata, acuta denticulata, *utrinque tomentosa mollissima*, supra ferruginea subtus incana, nervosa, venoso-reticulata. Petiolum parum intra marginem insertum. Glandulae supra oblongae planae in regione apicis petioli. Racemus terminalis spithameus, pedunculi partiales sparsi tripollicares. Flores copiosi subsessiles conferti incani, *masculis cum femineis mixti*. Bracteae setaceae florum longitudine. Capsulae tectae setis flexibilibus furfuraceo-tomentosis copiosissimis. *Styli fusci penicellati*." The diagnostic characters in italics essentially exclude *Mallotus*, and I do not find any Chinese euphorbiaceous species to which Geiseler's description satisfactorily applies.

The new species is dedicated to Dr. Liang Chin Li, Keeper of the herbarium of the Fan Memorial Institute of Biology, Peiping, in grateful acknowledgment of his friendly communication of essential data and material.

Mallotus apelta (Lour.) Muell.-Arg. Linnaea, **34:** 189. 1865; in DC. Prodr. **15**(2): 963. 1866. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 171. 1914, excl. var. — Hutchinson in Sargent, Pl. Wils. **2:** 525. 1916, p. p.

The species is perhaps best understood as the northern representative of *M. ricinoides*, sensu lato, and the much needed typification of the latter species should not be attempted without a critical consideration of all the forms so far included under *M. apelta*. Pax & Hoffmann separate (op. cit. 163) *M. ricinoides* from *M. apelta* using the length of the inflorescence, which in the former may be 30 cm. long, and is supposed in the latter to be 12 cm. or shorter. In reality specimens of undoubted specific identity are found which reverse the supposed character, such as *Noerkas 355*, Celebes (*M. ricinoides* : inflorescence in fruit not exceeding 20 cm.) (NY), and *Tsang & Fung 205*, Hainan (*M. apelta* : inflorescence in fruit exceeding 30 cm.) (A). Metcalf has indicated (Lingn. Sci. Jour. **10:**

489. 1931) that *Ching 7111* from Kwangsi (A, UC) may be distinct from *M. apelta* on account of its peculiar capsular indument and of its long cyme. The specimens that Metcalf understands as *M. apelta, Levine 1176, Tsiang 1434, 1541* (A) conform to the type, as far as I can judge from the photograph of Loureiro's specimen in the Paris Museum of Natural History. I find, however, that *Demange 1187* (A), from Tonkin has an inflorescence of a length not exceeding 30 cm., and a capsular indument intermediate in nature between that of *Ching 7111* and of *Tsiang 972* (A) from Kwangtung, the latter having a cyme in fruit exceeding 35 cm. in length. In *Henry 13640* (NY), from Tonkin, the capsular indument perfectly matches that of *Ching 7111* and the fruiting cyme, though broken off, exceeds a length of 50 cm. *Fan & Li 4* (A), from Hunan, has the very same capsular indument of *Ching 7111,* but a fruiting cyme only 17 cm. long. These findings bear out Wilson's statement (in Sargent, Pl. Wils. **2:** 525. 1916) that the length of the inflorescence of *M. apelta* varies much, and depends upon the vigor of the shoot. Unquestionably, in some specimens the capsular indument is short, and thickly villous (*typical form*), suggesting that of *M. albus,* and in others long and lanose in aspect (*Ching 7111*), similar to that of *M. ricinoides.* The intergrading between extreme states, however, is so complete that the notion of attempting a segregation is not encouraged when the material available at this time in the herbarium is sorted for the purpose. It is suspected, considering all specimens, that the southern ones tend to have a longer inflorescence, and that edaphic factors are at play, possibly favoring the ultimate segregation of distinct strains within the common, or nearly common, area of present distribution. Larger collections and extensive field work particularly are needed to define the issue of practical classification of these forms.

Mallotus Paxii Pamp. Nuov. Giorn. Bot. Ital. **17:** 414. 1910.

Mallotus apelta var. *a chinensis* (Geisel.) Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 171. 1914. — Handel-Mazzetti, Symb. Sin. **7:** 214. 1931.

Mallotus Stewardii Merr. ex Metcalf, Lingnan Sci. Jour. **10:** 488. 1931.

The synonymy of *M. Paxii* and *M. Stewardii* is established by the specimens and by the literature. The possibility that *Croton chinensis* Geisel. is the same as *M. Paxii* is excluded because *M. Paxii* does not occur in the southern maritime provinces of China whence Geiseler's specimen undoubtedly came. To my knowledge *M. apelta* occurs in Indo-China, Hainan, Kwangtung, Fukien, Kiangsi, Kiangsu, Hupeh, Hunan, Szechuan. *Mallotus Paxii* is found in the same areas with the exception of Indo-China, Hainan and Kwangtung. The classification of

♂ specimens of the two species rests upon what may be called intangibles of habit, that is to say largely on the opinion of the individual taxonomist. Occasionally ♀ specimens are found which are exceedingly critical, like *Sun 1373,* Anhwei (A). This notwithstanding *M. Paxii* is better treated, I believe, as a distinct species. *Mallotus Castanopsis* Metc. has clear specific rank but if *M. Paxii* is subordinated to *M. apelta* it may not be kept distinct for it intergrades with *M. Paxii.* Although barely outlined north and south a specific range exists and *M. Paxii* is not found in the south. It is also likely that comprehensive subordinations of inadequately understood forms are undesirable on general grounds. In the present conditions of the botanical exploration of China a moderately narrow, or even a narrow concept of taxonomic limits best serves the purpose of making generally available the data obtained by the study of herbarium specimens. The notion of Huber (Bull. Herb. Boiss. ser. 2, **6:** 345. 1906) and of Lanjouw (Euphorb. Surin. 40. 1931) that the ends of classification are furthered in certain cases by narrow concepts is not without merit.

Mallotus Roxburghianus Muell.-Arg. var. **glabra** Dunn, Jour. Linn. Soc. Bot. **38:** 365. 1908.

The material available is represented by the type collection, Yenping, Buong-Kang, *No. 3627* Hongkong Herb., *Dunn 1136* (A), which is sterile. I find in this specimen neither the characteristic pubescence of *M. Roxburghianus* nor the limb-glands almost invariably present in *Mallotus* species of this section. Such differences may be indicative of a variety, although taken together they are scarcely suggested as less than specific. To my knowledge *M. Roxburghianus* is not recorded at intermediate points between northeastern India and eastern China, and I have not seen as yet a duplicate of Dunn's collection that can be identified as a *Mallotus.* Dunn's specimen may prove to be a *Macaranga.*

Mallotus albus (Roxb.) Muell.-Arg. Linnaea, **34:** 188. 1865; in DC. Prodr. **15**(2)**:** 965. 1866. — Hook. f., Fl. Brit. Ind. **5:** 429. 1887. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 168. 1914. — Gagnep. in Lecomte, Fl. Gén. Indoch. **5:** 353. 1925.

The only specimens I have seen from China are five sheets of *Henry's* collection, *11991c, 11991d, 11991e* (NY), all apparently from Szemao in Yunnan, and cited by Pax & Hoffmann under this species. The ♂ and ♀ inflorences are branched, very seldom simple. The leaves are usually smaller as a rule in southern Indian specimens, up to 1 foot broad in one Yunnan collection. The indumentum is mostly rusty brown, rarely whitish. The capsular processes are stiff, short, heavily tomentose-

floccose, very moderately spreading. It may be suspected that the lone record of *M. macrostachyus* for Tonkin (Gagnep. op. cit. 357) is based upon a critical specimen of *M. albus* which but for its inflorescence cannot be distinguished with certainty from that more southern species. *Mallotus albus* is best separated from *M. apelta* by the thick texture of the leaf, which is usually repand-dentate and reminiscent of *Macaranga denticulata* and *M. indica*. It differs from *M. ricinoides* in the shorter and stiffer capsular indumentum and from *M. paniculatus* (*M. cochinchinensis*) in habit and inflorescence.

Mallotus repandus (Willd.) Muell.-Arg. Linnaea, **34**: 197. 1865; in DC. Prodr: **15**(2): 981. 1866. — Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII)**: 181. 1914.

Mallotus contubernalis Hance, Jour. Bot. **20**: 293. 1882.

The isotype of *M. contubernalis, Sampson & Hance 17694* (K) is a specimen of *M. repandus* fully within the limits of the species as represented by *Thwaites 2115* from Ceylon (NY), which is cited by Mueller-Arg. under *M. repandus α genuinus*. The Hance specimen has the usual yellowish capsules of *M. repandus*, not a fruit "densely clothed with rufous glandular tomentum," as Hance describes it. It is difficult to understand why Hance's *Mallotus* characterized in the presentation as having dicoccous capsules and leaves ultimately glabrate has been accepted by Pax & Hoffmann as the type of a species with glabrous leaves and tricoccous capsules.

The distinction established by Mueller-Arg. between *M. repandus α genuinus* (technically the type of the species) and *β scabrifolius* is rejected by Pax & Hoffmann (op. cit. 182), apparently because numerous intermediates occur. Wilson also observes (in Sargent, Pl. Wils. **2**: 526. 1916) that in this *Mallotus* the pubescence is most variable. In my opinion a valid varietal difference can be established rather upon the total sum of characters than on the single factor of pubescence. The existence of glabrescent intermediates does not detract from the fact that a specimen of the type with subrhombic leaves, 7 cm. long or less, with persistently pubescent petioles and venation, differs from a specimen of the variety which has ovate cordate leaves, mostly longer than 7 cm., and soon glabrous petioles and venation. The type so understood is matched by *Lau 61* (A) and *1526* (NY) from Hainan; *McClure s. n.* (UC), *Tsiang 900* (A), *Oldham 478* (NY) from Kwangtung; *Faurie 409* (A), *Mori 607* (UC), *Henry 714* (NY) from Formosa. The last three specimens are interesting: *Faurie 409* has manifestly pubescent petioles but strongly glabrescent to glabrous limbs, being intermediate between the type and the variety in regard to pubescence; *Mori 607* has

an exceedingly branched cyme, and *Henry 714* together with dicoccous fruits bears at least one tricoccous capsule. Wright (NY), Hongkong, cited by Mueller-Arg. as typical of *a scabrifolius* is matched by *Levine 662* (A) from Honan Island; *McClure 2033* (UC) from Kwangtung; *Ching 1597, 2177* (UC) from Chekiang.

The limits of *M. repandus,* its varieties and allied species will be discussed in the summary following the notes of *M. Millietii.*

Mallotus repandus (Willd.) Muell.-Arg. var. **megaphyllus,** var. nov.

A typo foliis majusculis late ovatis cordatis ad 19 × 13 cm. longis latisque pubescentibus vel glabrescentibus, cymis ♀ abbreviatis oligocarpicis bene recedit.

INDO-CHINA: Laos, Mong Hsing, *Kingdon Ward 8922,* **type** (A ♀). YUNNAN: Mengtze, large climber, *Henry 13696* (A ♂); Tonkin, *Balansa 4791* (NY ♀).

The last named specimen is referred with doubt to *M. repandus* by Pax & Hoffmann [Pflanzenr. **63 (IV. 147. VII):** 182. 1914]. *Handel-Mazzetti 437* (A) from Fukien; *Tsiang 2374* (A) from Kwangtung; *Ching 1597* (A) from Chekiang, are perhaps closer to the new variety than to the type. The range, Yunnan-Chekiang through Kwangtung and northern Indo-China (Tonkin, Laos), appears not to lack floristic significance. The valley of the Red River, especially, is suggested as the main line of diffusion of species that occur in southern Yunnan and Hainan, and that are unrecorded elsewhere in China.

Mallotus illudens, nom. nov.

Mallotus contubernalis sensu Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 180. 1914. — Handel-Mazzetti, Symb. Sin. **7:** 214. 1931. — Non Hance.

Mallotus repandus sensu Hutch. in Sargent, Pl. Wils. **2:** 526. 1916, p. p.

The differences between this species and *M. repandus* are pertinently summarized by Pax & Hoffmann in ". . . ambitu foliorum, glabritie, inflorescentiis simplicibus, ovario triloculari . . ." I do not agree with those authors, however, that *M. illudens* resembles *M. philippensis* and suspect that they intended to refer to *M. chrysocarpus* because this often resembles the latter species. *Mallotus illudens* intergrades with *M. repandus* var. *scabrifolius,* the ♂ specimens of either being mostly indistinguishable in the herbarium. The specific character, basically, is the tricoccous fruit, and in part the geographic range.

Typical specimens of *M. illudens* are *Chung 6642* (A) from Fukien; *Wang 239* (NY) from Kiangsi; *Ching 3086* (A) from Anhwei; *Tsiang 4866* (A) from Kweichow; *Ching 5599* (A) from Kwangsi; *Handel-*

Mazzetti 514 (A) from Hunan; *Yü 689, Wang 21868* (A), *Farges 827* (UC) from Szechuan; *Tsai 52199* (A), *Ducloux 214* (NY) from Yunnan. The center of distribution, to judge from the total number of available collections that best represent species, is the Hupeh-Szechuan region.

Mallotus chrysocarpus Pamp. Nuov. Giorn. Bot. Ital. n. s. **14:** 413. 1910.

Mallotus repandus var. *chrysocarpus* Hand.-Mazz. Symb. Sin. **7:** 214. 1931.

Mallotus repandus sensu Pax & Hoffmann, Pflanzenr. **63 (IV. 147. VII):** 180. 1914. p. p., non Muell.-Arg.

In the herbarium this *Mallotus* is easily recognized by its ovate to elliptic-lanceolate leaves being softly pubescent beneath, in certain specimens somewhat resembling those of *M. philippensis*. The capsule will probably be found to be larger than that of *M. repandus* and to have a thicker indument. It is tricoccous, as in *Chu 1880* (FI), from Szechuan, or dicoccous as in *Wilson 3542* (A), *Henry 1494* (A), from Hupeh. I have seen no specimens outside of Szechuan and Hupeh.

Mallotus Millietii Lévl. Fl. Kouy-Tchéou, 165. 1914. — Rehd. Jour. Arnold Arb. **14:** 233. 1933.

A very distinct species, easily identified from ♀ specimens, not rarely found in herbaria but seldom correctly named. Henry recognized it, *in sched.*, from *M. repandus*, but it was left to Rehder to contribute the first clear summary of its characters. In pubescence *M. Millietii* is near *M. chrysocarpus;* in leaf outline it resembles robust specimens of *M. illudens*. The fruit, however, is peculiar and unmistakable. In *M. repandus* and *M. illudens* the capsule is scarcely larger than 10 mm., smooth or rugose when dry, usually dull yellow, with a very fine, dust-like indumentum. In *M. Millietii* the epicarp appears under the naked eye to be scurfy-lepidote, bright yellow and orange. Under the lens close and short villous processes are evident which are heavily stellate-floccose. The fruit, when ripe, is seldom less than 15 mm. broad.

The species occurs in Kwangsi, *Steward & Cheo 602, 387* (A), and more widespread, it seems, in Yunnan, *Henry 10669* (A, NY), *10700* (A), *10700a* (A, NY), *Forrest 7524, 12027* (A).

Mallotus Millietii var. **atricha,** var. nov.

A typo foliis glabris recedit.

KWANGSI: Tan-ngar, 10 li E. of Hoo Chi, a scandent shrub 18 ft. long, common in thickets alt. 1700 ft., *Ching 6396* (A **type,** NY, UC).

It is suggested that *Mallotus Millietii, M. chrysocarpus, M. illudens* and *M. repandus* are descended from a common parent form, the last

two being so close that they might be considered conspecific under a normally broad taxonomic concept. *Mallotus chrysocarpus* appears to be a leaf-form of *M. repandus* judged by the specimens available but the evidence is on the whole in favor of its being nearer to *M. Millietii* than to any other members of the group. In my opinion these four species afford a classic instance of the segregations that take place in China within a group having Indo-Malayan affinities. Aside from more or less relevant differences in fruit, habit, and pubescence it may be suspected that these four species have a geographic background, as follows:

Mallotus repandus. — A southern form, essentially dicoccous, ranging from India to New Caledonia. In China it occurs almost exclusively in the maritime or southern provinces, Hainan, Kwangtung, Kwangsi. The Hainan specimens, particularly, are undistinguishable from Indian and Malayan material. *Mallotus repandus* intergrades with *M. illudens* through var. *scabrifolius*. This variety, interpreted on the basis of *Wright* (NY), Hongkong, cited by Mueller-Arg., occurs as far north as Chekiang. *Mallotus repandus* var. *megaphyllus* is restricted to northern Indo-China and Yunnan, although transitional forms towards the type-species occur probably as far north as Kiangsi.

Mallotus illudens. — A northern form, essentially tricoccous, and apparently typically Chinese. Its distribution is prevailingly continental, throughout China south of the Yangtze River.

Mallotus chrysocarpus. — A suggested mutation or extreme form of *M. Millietii* with which it has the pubescence and the leaf-shape in common. Larger collections and field work are needed to define its characters, range, and affinities. Not represented in the material examined outside of Hupeh and Szechuan.

Mallotus Millietii. — Very strongly characterized by its large capsule and capsular indument. In the latter character with a tendency to be intermediate between Sect. Echinus and Sect. Philippenses. So far as known, collected only in Yunnan and Kwangsi.

Several specimens in our herbarium, unfortunately too incomplete for description indicate that further additions to the varieties and species of *Mallotus* Sect. Philippenses may be expected from Sikang (east Tibet) and Yunnan.

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